Notes on Waterfall Swift *Hydrochous gigas*: I. Occurrence and nesting

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Received 30 April 2005

Waterfall Swift *Hydrochous gigas* (originally Giant Swiftlet *Collocalia gigas*) was described from a female taken by A. L. Butler, in 1900, at Semangkok (=Gap) Pass, at *c.*820 m, in Selangor, central Peninsular Malaysia (03°42'N, 101°45'E) (Hartert & Butler 1901). On 2 October 1900, M. E. G. Bartels collected another specimen, at Pasir Datar (06°46'S, 106°56'E), on the south-west slope of Mt Pangrango, western Java (Finsch 1901, 1902, Bartels 1906), where it was not particularly rare (Bartels 1915). Its distribution on Java is apparently restricted to the western part, with no sight records from central or eastern Java. The easternmost locality where it has been observed is the Kole Beres tea estate (*c.*07°12'S, 107°17'E), on the southern slope of Mt Patuha (Bartels 1931). For Sumatra, the first records were two specimens (male and female) taken by E. Jacobson in the Solok Mountains, Padang Highlands (*c.*00°48'S, 100°39'E), in July 1914 (Robinson & Kloss 1924). These are the only specimens from Sumatra, although there are sight records from Mt Kerenci (*c.*01°47'S, 101°13'E), Mt Leuser National Reserve (*c.*03°45'S, 97°10'E) and elsewhere (Van Marle & Voous 1988). In Borneo, *H. gigas* is known only from sight records, some insufficiently documented (Smythies 1999).

The species' biology is poorly understood, its behaviour unstudied, and no accurate population counts at individual colonies available. It is considered Near Threatened due to the probably small population and apparent disappearance from certain localities (Chantler 1999, Chantler & Driessens 2000, BirdLife International 2001). I studied the Waterfall Swift in the field, at its breeding sites, paying special attention to behaviour and breeding. The present paper describes the nesting habits of the Waterfall Swift.

My original aim was to monitor a nesting site at the foot of Mt Gagak, near the Mt Halimun complex in western Java, sited in a cave below a riverbed, with three large boulders forming a 'roof' and a small waterfall at its front, in the River Cisekati (Becking 1971). The site was first discovered by the Bartels family in 1922 and monitored by them until *c.*1939. It was no longer used in 1971, when I revisited the site, probably due to heavy deforestation in the environs. In October–December 1971 and 1977 I searched for other nesting sites in western Java, along a number of montane rivers deemed suitable for the species.

Nesting sites

A total of seven nesting localities was discovered on three mountains in western Java: on Mt Pangrango-Gede (3,019 m), Mt Salak (2,211 m) and in the Mt Halimun complex (1,370–1,929 m). The species appeared widespread on these mountains, especially where their specific biotope requirements were available. Nearly all nesting sites were near waterfalls or along rivers close by, in areas of submontane or montane, usually primary, forest far from any human activity.

At a locality with nesting swifts, two types of nest sites were usually distinguished. Nests of the first or main type, *c.*80–90% of the total number observed, were at the waterfall itself. The fall was usually in a rather open situation, often within primary forest, and large water masses fell steeply from a rock outcrop, producing a fall of considerable height. In such cases, nests were placed in small niches within the rock walls near the top of the fall, close to or even behind the water 'curtain', or beside of the fall (Fig. 1). Usually, nests at each site numbered 5–8, rarely more.

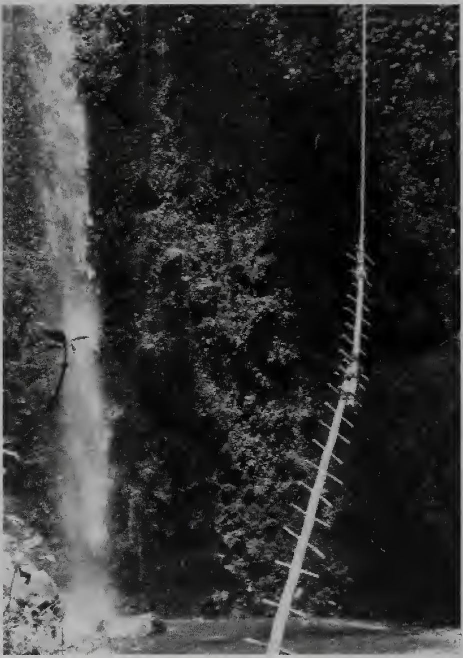

Figure 1. Waterfall in the River Cicewol, on the south side of Mt Salak, western Java. The vertical rock wall beside the water 'curtain' contains Waterfall Swift *Hydrochous gigas* nests. Note the primitive ladder used to examine the nests (Jan-Hendrik Becking)

The second type, numbering *c.*10–20% of the total number of nests, were in nearby narrow gorges or ravines, where rapid streams or rivulets formed small cascades of water. The nests were beside the same river as the waterfall or on a nearby tributary, some just 20–30 m from the main waterfall site, and were placed in holes or niches in the vertical earth or rock wall, one to several metres above the stream and often 3–15 m apart. In such situations, nests were not directly exposed to water spray or seepage. Such nests were perhaps second-choice sites, and the number at each locality usually varied from one to four. At the well-studied Cicewol, Mt Salak site (see below), for instance, in 1977–78 there were two additional nests besides the *c.*7–8 nests at the fall: one 20 m downstream, and the other 10 m upstream, of the fall.

I also found nests, singly or clumped 2–3, widely spaced and with no apparent association to any colony. These were sited along fast-running currents or rivulets within dense primary forest in the same regions.

Study site

A nesting site below a relatively low waterfall (25 m) in the River Cicewol (06°46'S, 106°56'E), on the south side of Mt Salak at *c.*1,100–1,200 m, was

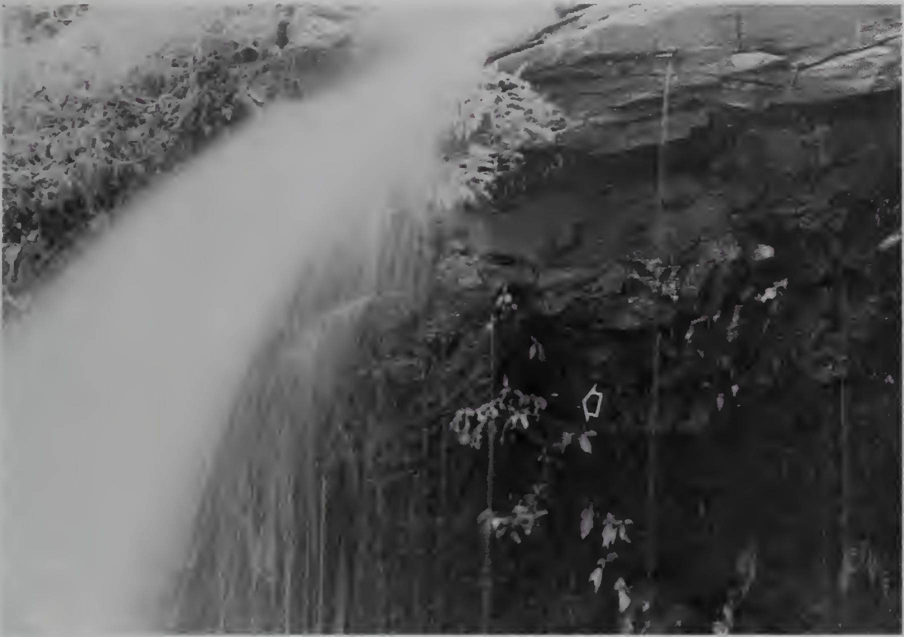

Figure 2. Nest of Waterfall Swift *Hydrochous gigas* containing an egg near the crest of Cicewol waterfall, Mt Salak. It is partially sited below the water curtain of the fall as can be noted from the vertical streams of water in front of the nest (Jan-Hendrik Becking)

selected for more detailed observations. At this site, the river dropped from a vertical, east-facing rock surface, forming a waterfall with a pool below. The walls around the fall were clad in a short vegetation of ferns (particularly Hymenophyllaceae), hydrophilic dicotyledons (mainly Urticacea, *Elatostema* spp.), mosses (bryophytes) and liverworts. The site was slightly shaded by overhanging trees above and exposed to direct sunlight for only a few hours per day. Approximately 7–8 nests were sited near the top of the waterfall, below, behind or close to the water 'curtain', on ledges and in holes within the vertical rock and side walls of the fall. To closely examine the nests, bamboo ladders and scaffolds were constructed (Fig. 1), which were removed immediately following nest inspection to minimise disturbance. Construction, nest inspection and dismantling took *c.*2–3 hours for 50% of the nests, with the other half examined the following day. Ambient temperature at the site was *c.*15°C in the early morning, rising to 25°C at noon on sunny days with no cloud and falling to *c.*9–12°C at night. Relative humidity was close to saturation (96–100%).

Observations

Seven nests were discovered at the Cicewol site on 30 October–5 November 1977. They were located in the crescent-shaped andesitic rock surrounding the fall. More nests may have been present, as I subsequently found the remnants of a fresh egg in the pool, apparently from a nest not detected earlier. On 12 November I returned with my Indonesian assistants to closely examine the nests. Three nests near the top of the fall, close to or behind the water, were inaccessible and therefore not examined. Two of these possibly had young, from observations with binoculars. The other was too deep within a crevice to determine its contents. The four lower nests, at *c*.8–16 m, were examined: two each had a single egg at different stages of incubation, one fresh, the other hard-set; the third appeared to be under construction or repair, as fresh green moss and liverworts had recently been added to its rim; and the fourth nest held a very young nestling. Nest inspection was repeated on 20 and 27 November, permitting description of the plumage development (see Part II). Heavy rainfall caused the water flow to approximately double by the 20th, with large tree stems and branches coming over the falls, and forcing me to abandon my camp site close to the river.

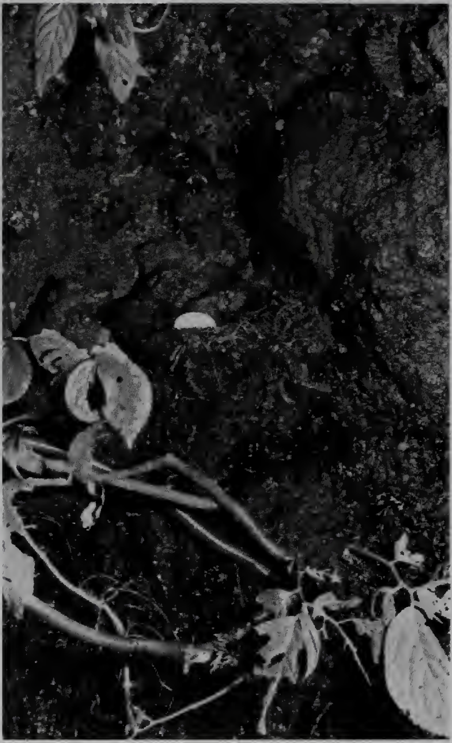
Figure 3. Close-up of the same nest as in Fig.2 (Jan-Hendrik Becking)

In 1978 I returned to the same site in September–October. The same number of nests (7–8) was present. A notable degree of nest fidelity was found, as *c*.50% of the 1977 nests were occupied. Although this visit was earlier in the season than in 1977, breeding had commenced and the nests were at different stages. Of the six lower nests examined, one had a single hard-set egg, one a very recently hatched nestling, three a small chick at various stages of development, and the last an older, feathered nestling.

I continued to monitor this site subsequently, in 1982 (May–August), 1983 (June–August), 1987 (September–November), 1989 (March–April), 1990 (July–August), 1992 (May–July), 1994 (March–May), 1997 (April–May) and 2001

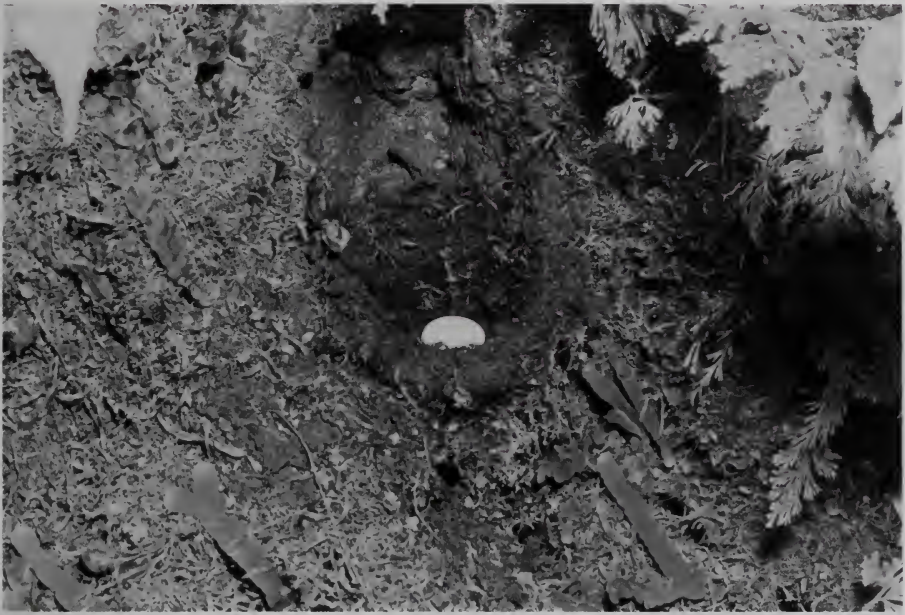

Figure 4. Nest of Waterfall Swift *Hydrochous gigas* of the second type, i.e. not directly associated with a waterfall, but placed in the earth wall along the bed of a rapid rivulet, Mt Pangrango, western Java (Jan-Hendrik Becking)

(July–August). During these visits—especially during the breeding season—I usually restricted myself to estimating the number of birds present and counting the nests visible from below. Prior to 1992 the nesting site was still intact and appeared to be occupied by the same number of pairs. By 1997, however, deforestation had commenced upstream nearby, and there was increased human activity. When I visited in 2001 I found the environment even more degraded by logging. Swifts were still present, albeit just *c*.2–3 pairs. Their continued presence indicates a high nest-site fidelity, as is known in other swift species.

Nesting habitat and conservation status

During the search for nesting sites of Waterfall Swift in 1977, the species appeared widespread on the three mountains investigated. Main nesting sites appeared to be sited at waterfalls in montane rivers within primary forest, whilst secondary nesting sites were in narrow river gorges. The preference for undisturbed forest areas was confirmed by developments at the Cicewol site, where degradation of the surrounding forest was coincident with a reduction in Waterfall Swift numbers. Given the rate of deforestation even in montane areas within the species' range and the swift's apparent fidelity to breeding sites, its conservation status is cause for concern. A thorough investigation of its past and present occurrence may lead to its being classified as Vulnerable; see also BirdLife International (2001). At some colonies unscrupulous collectors may also be a threat.

Acknowledgements

I am greatly indebted to Dr Joost Brouwer, Lord Cranbrook and Dr David W. Snow for valuable suggestions and comments on an earlier draft. The study would have been impossible without the assistance of a semi-permanent crew of Sundanese-Indonesian helpers: Endang, Adi Nurhadi, Maman, Odik, Engkus, Adman and Ocang. They were indispensable and should share the outcome of this study. I am indebted to them also for their unceasing friendship and care, often under difficult conditions. In Sundanese I would say: 'Hatur Nuhun!'. Dr Charles T. Collins, as referee, made many useful comments on drafts of this paper.

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